

Measuring Commuting in the American Time Use Survey

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Importance of Commuting

Commuting:

- Plays a major role in the decision to work
- Reduces time for other activities
- Impacts household location decisions
- Is unpleasant (Kahneman *et al.* 2004)

Commuting in ATUS Analyses

- Tradeoffs with other activities, e.g. health-related (Christian 2012)
- Trends over time (DeLoach and Tiemann 2012)
- Disparities by gender and related factors (Kimbrough 2014)
- As covariate in a range of analyses

Advantages and Disadvantages of ATUS

The ATUS contains:

- Respondent characteristics that commonly used transportation datasets lack, such as wage and salary information
- Other uses of time on the same day
- Additional ATUS modules and linkages to CPS panels

But the ATUS does not collect information on trip purposes

What is a commute?

Working definition: Trips from home to work or from work to home

- When these trips are direct—with no stops along the way for other activities—classification is straightforward
- Problems arise when an individual stops along the way

- ATUS Travel Related to Work
 - Travel immediately preceding work spells + uninterrupted travel after work spell if next activity is at home
- Brown and Borisova (2007)
 - All travel between home and work
- McGuckin and Nakamoto (2004)
 - All trip tours between home and work with stops of no more than 30 minutes

ATUS Travel Related to Work

- Based on activities before and after travel spells
- Therefore captures:
 - Travel immediately preceding work spells
 - Uninterrupted travel after work spell if next activity is at home
- Used in e.g. DeLoach and Tiemann (2012)

Pros:

- Easy to use: activity code 180501 (170501 in 2003)

Cons:

- Stops (especially on the way home) exclude travel
- Likely also includes some non-commuting (e.g. at lunch)
- Definition changed somewhat between 2003 and 2004

Brown and Borisova (2007)

- All travel between home and work
- Used in e.g. Christian (2012)

Pros:

- Straightforward definition: identify when a respondent is at home and work, and tally up all travel in between

Cons:

- Clearly includes some travel that is not commuting
- Only defined for people who are at both home and work during the day

Trip Tour Methodology

- Applied to National Household Transportation Survey (NHTS) by McGuckin and Nakamoto (2004)
- All travel between home and work *with stops of no more than 30 minutes*

Trip Tour Methodology

Pros:

- Corresponds reasonably well to concept of commute as travel between home and work, including brief stops but not longer ones
- Defined and used in extensively studied transportation-focused survey

Cons:

- Relatively difficult to calculate
- Arbitrary choice of allowable stop length
- Only defined for people who are at both home and work during the day

Necessary terminology:

- *trip chains*: sequences of travel, possibly including stops;
- *trip tours*: trip chains which contain stops of no more than 30 minutes; and
- *commuting trip tours*: trip tours that begin at home and end at work or begin at work and end at home.

Using this framework, commuting trip tours are:

- Home→Work or Work→Home,
- with stops no longer than 30 minutes.

Additional Complications in the ATUS

- “Personal care” activities do not have associated location
 - Can be significant, especially in morning
 - Solution: Assume that all sleep spells at beginning/end of diary day (4 AM) occur at home. If adjacent activities also have no location, assume these take place at home.
- Different travel modes are, in general, coded as separate travel spells
 - Solution: combine all consecutive travel spells

Sample Information

- 2008 wave of ATUS
- Ages 25-60
- Employed
- Weekdays
- Begin and end diary day at home

Table 1: Commute Characteristics of Workers in ATUS Sample

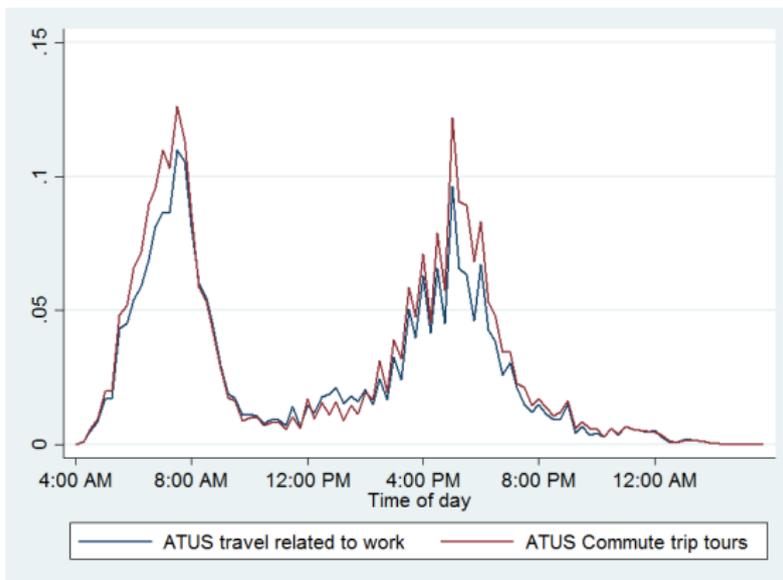
	Percent of Sample	Number of Diary Days
Nonstop trips between home and work		
At least one nonstop home-to-work trip	57.3%	1,573
At least one nonstop work-to-home trip	46.8%	1,335
At least one nonstop trip in each direction	37.1%	1,015
Trip tours between home and work		
At least one home-to-work tour	70.2%	2,037
At least one work-to-home tour	60.5%	1,788
At least one tour in each direction	54.7%	1,615

Table 2: Average Commute Times in Minutes, ATUS Sample

Preferred Measure:	
Commuting trip tours	37.7
Other Measures:	
Nonstop commutes only	26.9
ATUS “travel related to work”	33.3
All travel between home and work	49.2



Figure 1: Proportion of individuals commuting at times throughout the day, ATUS sample



Other Datasets

■ NHTS

- Large
- Relatively infrequent
- Transportation-focused
- Limited other characteristics

■ American Community Survey (ACS)

- Very large
- Yearly
- Detailed household and individual characteristics
- Collects only limited commute characteristics: Average time to work and departure time over past week

Analyses

- Aggregate commute time estimates
- Commute time throughout the day, ATUS and NHTS
- To-work commute time, all three
- Departure time, all three
- Regression analysis, ATUS and NHTS

Table 3: Average Commute Times in Minutes

Sample	To-work travel		Total work travel	
	Full sample	Excluding zeros	Full sample	Excluding zeros
ACS	25.0	26.1		
NHTS	18.5	28.6	37.0	55.2
ATUS	19.6	27.9	37.7	49.6

Figure 2: Proportion of individuals commuting at times throughout the day, ATUS and NHTS samples

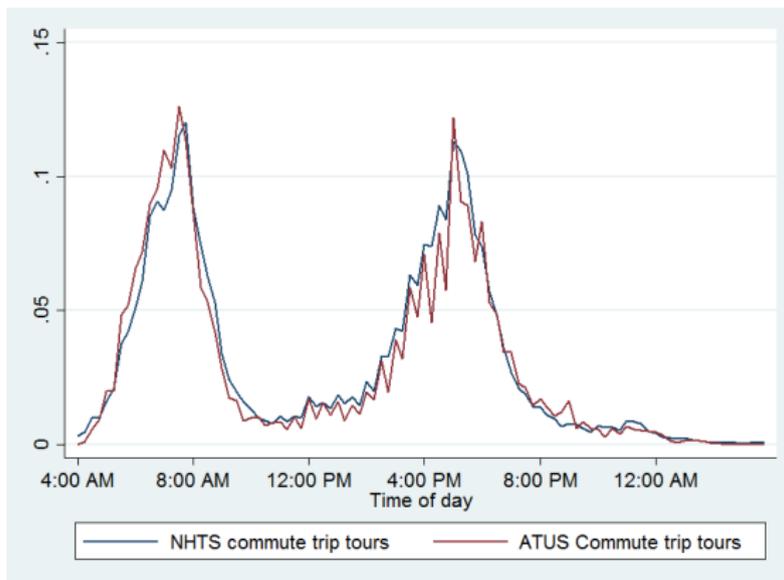




Figure 3: Proportion of individuals commuting to work at times throughout the day

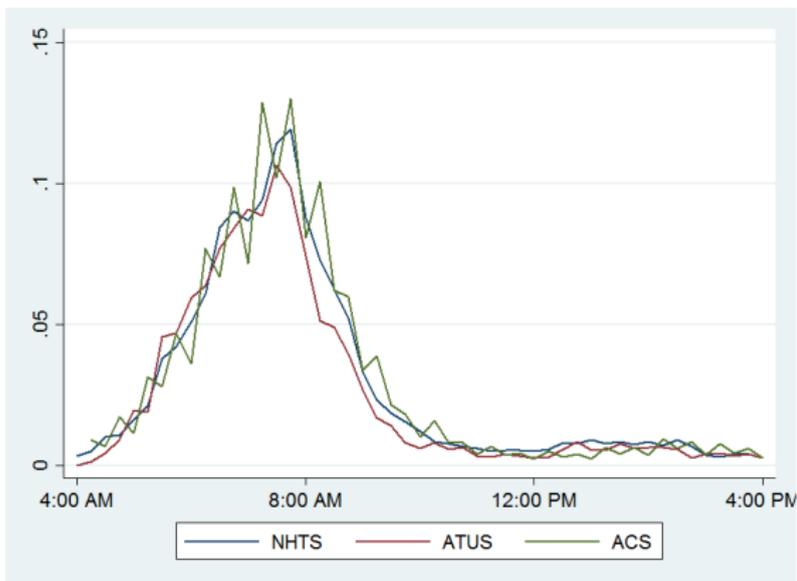


Figure 4: Distribution of departure times to work

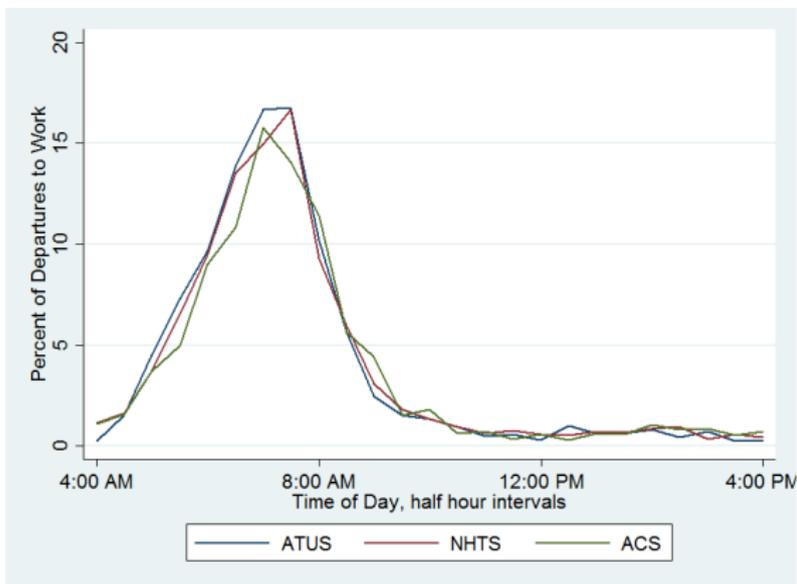


Table 4: Multivariate Analysis F-test Results

Characteristic	<i>P</i> value
Pooled Characteristics	
Sex	<.001
Education Levels	.218
Age Brackets	<.001
ATUS indicator	.798
Interacted characteristics	
Sex × ATUS	.389
Education × ATUS	.060
Age × ATUS	.591
Total of ATUS indicator and interactions	.102

- The trip tour methodology from the NHTS can be applied to the ATUS
- Estimates from the ATUS using this methodology are in line with those from the NHTS
- True both in aggregate and at times throughout the day
- Also in line with measures from the ACS
- Multivariate analysis shows no systematic differences between estimates from NHTS and ATUS using a small set of individual characteristics
- This methodology allows for additional analyses leveraging the strengths of the ATUS, with advantages over using activity code for travel related to work